Docket 71619 PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Scott D. Barnicki, Jennifer E. McCusker-Orth and Jerry L. Miller

Serial No.:	10/611,394	Group Art Unit:	1621
Filed:	July 01, 2003	Examiner:	Sikari A. Witherspoon

For: PROCESS FOR PREPARING β-HYDROXY-KETONES AND α,β-UNSATURATED KETONES

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

REQUEST FOR RECONSIDERATION

Applicants respectfully request reconsideration of the rejection based on 35 U.S.C. 103(a) set forth in the Office Action of June 15, 2004. This request is based primarily on the proposition that the §103(a) rejection is not supported by the prior art relied upon in the Office Action.

Applicants have discovered an improved process for the preparation of ketones selected from β-hydroxyketones, α,β-unsaturated ketones, and mixtures thereof by the base-catalyzed, liquid-phase crossed condensation of an aldehyde with a ketone. The condensation process is carried out in the presence of a small amount of a catalyst selected from hydroxides and alkoxides of alkali metals and alkaline earth metals. Applicants have discovered that maintaining the concentration of water in the reaction mixture or reaction zone to six weight percent or less gives improved process results, e.g., improved conversion and/or selectivity, especially selectivity to the desired ketone product(s).

The Office Action contends that all of the claims of the present applicarion are obvious under 35 U.S.C. 103(a) in view of the disclosure of Muthusamy et al U.S. Patent 5,583,263. The following passage appears on page 3 of the Office Action:

> With regards to the percentage of water found in the reaction mixture, the examiner finds that this limitation would have been obvious to a person of ordinary skill in the art. Muthusamy et al teach at col.3, lines 61-64 that the reaction mixture comprising the resulting ketones formed from the condensation reaction is dehydrated prior to subsequent reaction. The extent to which said mixture is dehydrated will effectually determine the amount of water present in the reaction mixture, To that end, the

> examiner purports that it would have been obvious to a person of ordinary skill to modify the rate of dehydration of the reaction mixture in order to obtain the desired weight percentage of water present in said mixture for further reaction, as taught by Muthusamy et al.

The portion of the Muthusamy et al reference referred to above, i.e., column 3, lines 61-64. does not pertain to the reaction of an aldehyde with a ketone, i.e., the process reaction disclosed and claimed in the present application. Furthermore, the dehydration referred to in the above-quoted passage does not pertain to water present in the reaction mixture during the condensation reaction of an aldehyde with a ketone. Instead, the dehydration mentioned by Muthusamy et al at column.3, lines 61-64 pertains to the conversion of β-hydroxy-ketones to α,β-unsaturated ketones. The dehydration mentioned by Muthusamy et al at column.3, lines 61-64 is carried out after the base-catalyzed aldehyde-ketone condensation reaction has been completed. Thus, it is applicants' respectful submission that Muthusamy et al do not teach or suggest applicants' novel process wherein a ketone and an aldehyde are reacted in the presence of a catalytic amount of a catalyst selected from hydroxides and alkoxides of alkali metals and alkaline earth metals while maintaining the concentration of water at 6 weight percent or less.

Applicants show in their disclosure the advantages and benefits resulting from carrying out the reaction of a ketone and an aldehyde in the present of not more that 6 weight percent water. The Examiner's attention s directed to Examples 1 and 2 and Comparative Example 3 of the present application. The results (shown in Table 1 on page 61) achieved in these examples establish that carrying out the ketone-aldehye condensation reaction in the presence of less that 6 weight percent water increases significantly the selectivity to the desired seven-carbon ketone product, i.e., a mixture of 4-hydroxy-2-heptanone (4H2H) and 3-hepten-2-one (3E2H), Nothing in the cited prior art teaches or suggests this advantage achieved in accordance with applicants' novel process.

The Examiner's attention is directed to Example 2 of Muthusamy et al which discloses the reaction of acetone (464.0 g) with n-butyraldehyde (145.4-145.9 g) wherein the n-butyraldehyde is added incrementally at a rate of 1.5 ml per minute to a mixture of the acetone and 100 ml of 1.0 N NaOH solution. Assuming the solvent to

be water, 100 ml of 1.0 N NaOH solution consists of approximately 4 g NaOH and 96 g water. Thus, the water concentration ranges from about 20 weight percent when n-butyraldehyde addition is begun to 18 weight percent when n-butyraldehyde addition is complete, based on the weight of the acetone and n-butyraldehyde used. Table 2 of Muthusamy et al shows that the maximum conversion of n-butyraldehyde achieved is 94% and, more importantly, the maximum selectivity to the desired C-7 ketone(s) achieved is 85%. Note especially that after 120 minutes reaction time (when all of the n-butyaldehyde has been added) at 44°C the selectivity of the n-butyraldehyde to the desired C-7 ketone is only 70%. This 70% selectivity is significantly less than the selectivities reported in the experimental portion of applicants' disclosure. Applicants believe that the superior results achieved by their novel process establish the patentability of the process defined by the claims under consideration.

The second reference cited in the Office Action, U.S. Patent 2,200,216, similarly is not relevant to applicants' novel process since the reference does not teach or suggest the reaction of a ketone and an aldehyde while maintaining the concentration of water in the reaction mixture at 6 weight percent or less, based on the total weight of the ketone and aldehyde reactants. The examples of U.S. 2,200,216 do not provide any information regarding conversions and selectivities achieved. Thus, a direct comparison of the results reported in the U.S. 2,200,216 reference and those reported by applicants cannot be made. However, the selectivity to the desired ketone obtained in the examples of the reference appears to be relatively low. To illustrate, Example 3 of U.S. 2,200,216 describes the reaction of acetone (200 parts by weight) and isobutyraldeyde (100 parts by weight – 1.4 mol) in the presence of water (100 parts by weight – 33% based on the weight of the ketone/aldehyde reactants) for a reaction time of over one hour. Example 3 describes the recovery of 5-methyl-hexylene-(3)-one-(2) (90 parts by weightr – 0.8 mol). Assuming 100% conversion of the isobutyraldeyde, the selectivity of the isobutyraldeyde to the desired C-7 ketone product is 57%, a selectivity substantially below the selectivities achieved by the operation of applicants' novel process. Again, applicants believe that the superior results achieved by their novel process as

compared to the results reported in U.S. 2,200,216 establish the patentability of the process defined by the claims under consideration.

Summary

In summary, it is applicants' respectful submission that the rejections based on 35 U.S.C. 103(a) are not supported by the cited prior art, primarily because the prior art simply does not disclose or suggest the novel features of the condensation process disclosed and claimed in the application under consideration. Accordingly, the withdrawal of the rejections and an early allowance of the application are earnestly solicited.

Respectfully submitted,

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11 OCT 04
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CERTIFICATE OF MAILING UNDER 37 CFR 1.8(a)

I hereby certify that this paper (along with any referred to as being attached or enclosed) is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231.

Cathy Adkins

Oct 13, 2004
Date